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Cover: Western diamond-backed rattlesnake, *Crotalus atrox*, swallowing a Merriam's kangaroo rat, *Dipodomys merriami*. Photograph taken in the field by Mike Comroe.

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Taxonomic Identity of an Extralimital Population of *Algyroides* Lizards (Squamata: Lacertidae) from Apulia Region in Southern Italy

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Abstract

We present the first vouchered report of a population of the genus *Algyroides* from Lecce Province in southeastern Italy, about 750 airline km S-SE of the only known Italian population in the northeastern provinces of Gorizia and Trieste. The population is morphologically referable to the Blue-throated Keeled Lizard, *A. n. nigropunctatus*. It is possibly introduced from Albania or western Greece through maritime traffic.

Keywords

Herpetofauna, *Algyroides nigropunctatus*, introduced species, karst, Mediterranean pseudo-steppe, Italy, Albania, Greece.

Introduction

The lacertid genus *Algyroides* is represented in Italy only by a population of *A. nigropunctatus nigropunctatus* (Duméril and Bibron, 1839) established in a narrow geographical strip in the northeastern provinces of Gorizia and Trieste (Bressi, 2010). In 2012 we discovered a population of *Algyroides* in Apulia Region, in the southeasternmost area of Italy, at about 750 airline km S-SE of the northern Italian population. The population is well established in the northern part of the “Costa Otranto—Santa Maria di Leuca e Bosco di Tricase” Natural Regional Park and its direct surroundings. It lives on steep karstic reliefs surrounded by Mediterranean pseudo-steppe vegetation, and, although easily distinguishable from other local species by its coloration and habitus, it is very difficult to approach and eluded capture until we eventually secured an adult male along a road on a small karst outcrop. This individual is described below to assess the population identity and some ecological notes on the Apulian population are provided.

Material and Methods

The voucher specimen (MSNS Rept 232) was collected on

21 August 2016 in Lecce Province, Otranto Sud, Capo d’Otranto, western side of the Provincial Road SP 87, in proximity to the Italian aeronautical base “136^a Squadriglia Radar Remota.” It was preserved in 70% ethanol and deposited in the herpetological collection of the Natural History Museum of Salento (Museo di Storia naturale del Salento, MSNS), Calimera. Measurements were taken with a Juwel digital caliper to the nearest 0.1 mm. Paired meristic and biometric characters are given left/right. The chromatical description is based on the colors of the individual in life.

Results

Description of the voucher specimen (Figures 1 and 2):

Adult male (hemipenes partly everted). Snout–vent length (from the tip of snout to the vent) 60.1 mm. Tail length (from the vent to the tip of the tail) 80.2 mm (only 6.4 anterior mm original, posterior part regenerated). Regenerated part progressively tapering, tip pointed. Distance snout-tip to posterior extremity of occipital scale 16.3 mm. Tail maximum width 6.8 mm. Head length (from the posterior margin of the retroarticular process of the lower jaw to the tip of the snout) 16.8/17.5 mm.



Figure 1. Lateral view of an adult male *Algyroides nigropunctatus nigropunctatus* (MSNS Rept 232) from Capo d’Otranto, Lecce Province, southeastern Italy. Photograph by O. S. G. Pauwels.



Figure 2. Ventral view of an adult male *Algyroides nigropunctatus nigropunctatus* (MSNS Rept 232) from Capo d’Otranto, Lecce Province, southeastern Italy. Photograph by O. S. G. Pauwels.

Head width (measured at the angles of the jaws) 10.0 mm. Head depth (maximum height of head from the occiput to the throat) 8.0 mm. Internarial distance (measured between the nares across the rostrum) 2.3 mm. Ear opening vertically elliptical. Rostral separated from the frontonasal scale by the two supranasals which are in broad contact with each other. Postnasal scales 2/2. Anterior loreal smaller than the posterior one. Prefrontals in contact. Parietals separated by the frontoparietals, the interparietal and the occipital. Interparietal and occipital in contact. Supralabial scales anterior to subocular scale 4/4. Supralabial scales posterior to subocular scale 2/2. Total number of supralabials including subocular 7/7. Supraocular scales 4/4. Supraciliaries 6/6. Supraciliary granules 10/10, row of supraciliary granules complete. Postoculars (in contact with anterior temporals) 2/3. Anterior temporals 3/4. Supratemporal scales along the parietal 4/3. Rostral, supranasals, internasal and prefrontals smooth, remaining scales of the upper surface of the head slightly rugose. Mental bordered posterolaterally by the first supralabial on each side, and posteriorly by the first pair of postmentals. Infralabials 6/6. Five pairs of postmentals in contact with the infralabials. Scales of the anterior two pairs of sublinguals in full contact with each other, scales of the third pair partly separated posteriorly by two gular scales, scales of the fourth and fifth pairs fully separated from each other by gular scales. Fourth pair of sublinguals largest. Gular scales along the throat midline 19, not including the collar scale. Nine enlarged collar scales. Scales of the ventral surface of the head and throat smooth. Enlarged mid-ventral scales counted longitudinally 23. Ventral scales smooth. Dorsal scales around midbody 27, the 12 mediadorsal ones much larger than the ones on the flanks. Dorsal scales each with a median keel. Anal plate anteriorly surrounded by eight preanal scales. A continuous series of 19/19 pore-bearing scales along the whole length of each femur, the two femoral pore-bearing scale series medially separated by two non pore-bearing scales. Lamellar scales under fourth toe 25/27. Supracaudals and infracaudals rectangular, each with a longitudinal keel, both on the original and regenerated parts. Dorsal surface of head, body and tail uniformly dark brown, with a few scattered black dots on the upper flanks. Lower flanks dark orange, gradually turning to dark brown upwards. Underside of head blue until the collar included, except a small dark orange lateral area on each side just before the collar. Undersurface of belly, arms and legs dark orange, slightly lighter along the belly midline and in the cloacal area. Underside of original part of tail dark orange. Underside of regenerated part of tail dark grey, darkening posteriorly, black at tail tip. Undersurfaces of palms, fingers and toes grey. Several adult males with a blue throat and an orange belly were observed in situ. Hatchlings observed in situ had a uniform dark brown dorsal color on body and tail.

Ecological notes:

Besides the above described specimen, we observed the species in the nearby “Costa Otranto – Santa Maria di Leuca e Bosco di Tricase” Natural Regional Park. It is mostly found on karst cliffs facing the sea, and on large karst boulders fallen from the cliffs and partly covered with vegetation (Figure 3). Individuals always stay near deep rock crevices where they quickly disappear when approached. A visit on 20 August 2016,

departing at 0600 h from the Palacia lighthouse and going northwards, allowed us to observe five adults and a hatchling between 0745 and 0900 h on a 500 m transect along the cliffs. The next day seven individuals, including five adults and two juveniles, all different from the individuals seen the day before, were observed on the same transect between 0800 h and 0930 h. Individuals became active when the temperature reached about 26 °C (temperature was 21 °C at sunrise at 0604 h). They spend some time basking in the morning, and when the temperature rises in the late morning and afternoon, they search rock surfaces in the shadow. On the same rocks, i.e., in strict syntopy, we observed *Tarentola mauritanica* (Linnaeus, 1758) (Gekkonidae), *Lacerta bilineata* Daudin, 1802 and *Podarcis siculus* (Rafinesque-Schmaltz, 1810) (Lacertidae) and *Hierophis viridiflavus* (Lacépède, 1789) and *Zamenis situla* (Linnaeus, 1758) (Colubridae). The *Podarcis* were in much higher density than the *Algyroides*, and much easier to approach. *Hemidactylus turcicus* (Linnaeus, 1758) (Gekkonidae) was also observed in this part of the park, but not in strict syntopy with *Algyroides*. We first noticed this *Algyroides* population in 2012, and we observed hatchlings, juveniles and adults, indicating that this population is well established and reproducing.

Discussion

The combined presence of a blue throat in adult males, of two postnasals, of small granular scales on lower flanks and the absence of a dark lateral band on flanks and of a dark vertebral line readily distinguishes the Apulian *Algyroides* from *A. fitzingeri* (Wiegmann, 1834), *A. marchi* Valverde, 1958 and *A. moreoticus* Bibron and Bory, 1833 (Arnold et al., 2007). The fourth species in the genus, *Algyroides nigropunctatus*, is found along the eastern Adriatic coast from northeastern Italy to western Greece and the Ionian islands. Only two subspecies are currently recognized. The possession of an orange belly and a blue throat is typical of the nominal subspecies and absent in *Algyroides nigropunctatus kephallithacius* Keymar, 1986. Males of the latter subspecies, endemic to the Greek islands of Kefallonia and Ithaca, show a yellow belly and a greenish throat (Peek, 2007). All the meristic, morphometric and chromatical



Figure 3. Biotope of *Algyroides nigropunctatus nigropunctatus* in “Costa Otranto – Santa Maria di Leuca e Bosco di Tricase” Natural Regional Park, Lecce Province, southeastern Italy. Photograph by O. S. G. Pauwels.

characters of the male described above fully agree with the variation known in the nominal subspecies (Bressi, 2010; Koleska and Jablonski, 2015). Melanistic individuals, reported from several localities within the range of *A. n. nigropunctatus* (Urošević, 2014), were not observed in the Apulian population.

The newly reported Apulian *Algyroides* population lives three km south of Otranto harbor. There are regular maritime lines between Otranto harbor and Vlore harbor in southwestern Albania, Corfu harbor on the Greek island of Corfu (type locality of *A. n. nigropunctatus*) and Igoumenitsa harbor in continental Greece. The boats carry diverse goods including construction materials and cement. Picariello and Scillitani (1988) suggested, based on genetic and morphological analyses, that the Apulian population of *Mediodactylus kotschy* (Steindachner, 1870) (Gekkonidae) could have been recently introduced from Greece through maritime traffic. We similarly suggest that the Apulian *Algyroides* population was recently founded by the incidental

importation through maritime traffic of individuals from southern Albania or western Greece. Genetic studies would be useful to assess more precisely the geographical origin of the Apulian population, and its affinities with some intraspecific clades already identified (Podnar and Mayer, 2006, Sergiadou et al., 2015). A monitoring of the Apulian population would allow for evaluation of its geographical extent and its potential competition with other, indigenous, lacertids.

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Literature Cited

- Arnold, E. N., O. Arribas and S. Carranza. 2007. Systematics of the Palaearctic and Oriental lizard tribe Lacertini (Squamata: Lacertidae: Lacertinae), with descriptions of eight new genera. *Zootaxa* 1430:1-86.
- Bressi, N. 2010. *Algyroides nigropunctatus nigropunctatus* in Italy: Notes on ecology, habitat selection and conservation (Reptilia, Lacertidae). *Italian Journal of Zoology* 71(supp. 1):113-116.
- Koleska, D., and D. Jablonski. 2015. Tail trifurcation in *Algyroides nigropunctatus* (Duméril and Bibron, 1839). *Ecologica Montenegrina* 3:26-28.
- Peek, R. 2007. Waarnemingen aan de blauwkeelkielhagedis (*Algyroides nigropunctatus kephallithacius*) van het eiland Kefallonia, Griekenland. *Lacerta* 65(4):136-141.
- Picariello, O., and G. Scillitani. 1988. Genetic distances between the populations of *Cyrtodactylus kotschy* (Squamata: Gekkonidae) from Apulia and Greece. *Amphibia-Reptilia* 9(3):245-250.
- Podnar, M., and W. Mayer. 2006. First insights into the mitochondrial DNA diversity of Dalmatian *Algyroides*, *Algyroides nigropunctatus* (Lacertidae). *Periodicum Biologorum* 108(1):85-87.
- Sergiadou, D., C. Papadaki and K. Sotiropoulos. 2015. Genetic uniformity in the Dalmatian *Algyroides* (*Algyroides nigropunctatus*) from the Greek mainland. P. 172. *In*: Abstracts. 13th International Congress on the Zoogeography and Ecology of Greece and Adjacent Regions. Hellenic Zoological Society, Irakleio.
- Urošević, A. 2014. Record of a melanistic Dalmatian *Algyroides*, *Algyroides nigropunctatus* (Duméril and Bibron 1839) (Squamata, Lacertidae), on the Island of Corfu, Greece. *Hyla* 2014(1):13-17.

The Chicago Herpetological Society: Some Recollections

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After two years as zoologist at Lincoln Park Zoo, I went to Brookfield Zoo (Chicago Zoological Park) in 1964 to be curator of reptiles/general curator. About two years after that I attended a meeting of the recently formed Chicago Herpetological Society. Due to rumors and a *Chicago Sun-Times* newspaper article by reporter Roger Ebert, my curiosity was pushed over the edge. Obviously this was a “new” CHS; I was confused as to what had become of the “old” CHS.

As a guide and assistant curator to Earl Chace at the Black Hills Reptile Gardens in 1953, I had met a fellow guide, Dick Wandre, from Chicago. He was attending Senn High School and belonged to a loosely organized Chicago Herpetological Society that had been started by leading herpetologist and director of the Chicago Academy of Sciences, Dr. Howard Gloyd. At the end of the tourist season we split up; he returned to Chicago on his newly-purchased motorcycle and I returned to Auburn, Michigan, about 100 miles north of Detroit; we had no further contact.

Chicago as a place to work and live had never been on my radar, preferring instead a more rural setting. It was while I was installing a large private zoo (Animal Land of Florida) near Ormond Beach that I was given an opportunity to come to Lincoln Park Zoo by then director R. Marlin Perkins. He was looking for someone who had (1) managerial experience with reptiles and other animals as well as (2) TV background and ability to maintain animals to script for the (then) new Wild Kingdom programs.

Soon after beginning work at Lincoln Park Zoo (1962), I began spending my lunch hours at the next-door Academy of Sciences (the building now houses the zoo’s offices) where I met its director, Dr. William Beecher, and his staff. Although I had heard of the earlier CHS through them and Dick Wandre, I was told that since two previous efforts had failed, there was no interest by Beecher in renewing a third CHS. Incidentally, another member of the former CHS was Ed Lace, who had become Director of the Sand Ridge Nature Center. Apparently Gloyd’s intention in creating a Chicago-based herpetological society was to attract and nurture budding biologists, primarily those interested in pursuing a career in herpetology. For several reasons including a lack of organization and too few members these efforts failed.

After attending a couple of CHS meetings in 1966, I was approached by a Capt. Robert Rubens who, along with about three others, expressed dismay that the current CHS was being populated by novices and hobbyists. They wanted to see the CHS become a “specialist” organization after Gloyd’s model that would attract both young and established scientists to join. They felt that because I was a professional zoo herpetologist I would fully support such an effort. In that context, they saw me as an ideal candidate for president.

I had no interest in running against anyone, particularly Bob Marek, but I wanted to see for myself the kinds of deficiencies that Capt. Ruben’s group was encountering. At the election in late 1967 I became their new president. However, at the monthly meetings there was clear evidence that the board of directors was highly enthusiastic and pragmatic about what needed to be done. Under Bob Marek’s leadership there had been obvious progress in growing this new version of the CHS whereas previ-

ous efforts by Dr. Gloyd had floundered.

Very quickly I found myself running counter to the reasons why Rubens and others had pushed for my presidency! Based on past efforts, it was clear that any attempt to create a Chicago Herpetological Society that was limited to a membership of perhaps a dozen professionals with minimal potential for recruitment was doomed to fail. History would repeat itself. In order to survive, the CHS needed to be composed of anyone and everyone in Chicagoland who wanted to join without restrictions, a pattern Marek had already implemented. Nevertheless, any professionals wanting to join would be welcome.

However, the forces that wanted to steer the CHS into an exclusive, small professional institution (at the expense of the status quo) were continuing. Fortunately, and with the blessings of the membership, Dick Buchholz and I teamed together to provide direction intended to appeal to the greatest range of group herpetological interests. Following my first year as president, Dick was elected president for two years (through 1969). To maintain our momentum I resumed the presidency for two more years through 1971. We both were committed to the concept of the CHS being composed of hobbyists, students and budding biologists without exception. After five years of diligent effort the grounding of the CHS appeared to be secure.

When I first assumed the presidency there clearly were already several dynamic, results-driven individuals holding offices who were unstinting in their commitment of time and effort including (but not limited to) the editor, Sidney Saltz, who drew up the articles of incorporation for the CHS which took effect on August 15, 1969, Esther Lewis who, along with her Alligator “Tea” generated a stream of members over the years, Dick Buchholz who was an exceptional problem-solver, Hedda Saltz who was membership secretary, and individuals who appeared on the scene at critical junctures such as the colorful and capable (late) Lee Watson who conducted at least two highly popular fund-raising auctions. Mike Dloogatch has maintained a highly popular editorial style for the CHS *Bulletin*, working with and then taking over from John Murphy after it became a monthly publication in 1987. For the first few years, the president acted as program chairman, tasked with attracting the most popular speakers available mostly from the immediate vicinity. Innovative concepts such as the annual “Show and Tell” (and others) were borrowed and adopted by several other herpetological societies across the country.

Two highly important factors that, in my opinion, contributed to the success of the CHS were (1) the continuity of the CHS *Bulletin*, featuring exceptional articles with broad public and professional appeal (plus Don Wheeler’s cartoon creation: “The Adventures of Spot”) and (2) efforts to select speakers (many with national exposure) with programs that have had broad public as well as professional appeal.

Obviously there are many components that comprise a successful enterprise of this kind, although some broader social environmental elements such as iPads and the like may temporarily impact the membership of any organization in a negative way. However, as in the past the diligence by a few strong and flexible individuals is the best insurance for a long CHS future. Let’s renew our collective push for the next 50 years!

Habitat, Activity, Habits and Evasion Tactics of *Apalone spinifera spinifera* in Colorado

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Little has been published on *Apalone spinifera spinifera* (Eastern Spiny Softshell) from the state of Colorado. Most of the information about the species in Colorado stems from Ham-merson (1999), in which the Colorado population is referred to as *Apalone spinifera hartwegi*, but this subspecies is now con-sidered the same as *Apalone spinifera spinifera* (McGaugh et al., 2008). There have been no independant studies of the spe-cies in Colorado. One reason for this lack of information may be the high levels of wariness displayed by *A. spinifera*, which make it difficult to observe (Webb, 1962).

Because *Apalone spinifera* has been widely studied across other parts of its range, studying this species in Colorado pro-vides valuable information that can be compared to populations in other states. Such a study is also valuable because of the unique Colorado environment—a high range of temperatures and generally a higher altitude than experienced by other popu-lations. In this study we have been able to make very good observations of undisturbed *A. spinifera* in natural habitat. Additionally we provide some insight into daily activity, habitat use, and evasion tactics. The latter is particularly important because little has been published on this subject for this species. The methods used here can be applied to other populations of this species as well as other species where the conditions for viewing are optimal, which will allow for more comparisons of habits and activity across different populations and taxa. With the ability to understand evasion tactics and daily activity, more can be learned about this species.

Methods

This study was conducted during the primary activity months in the years of 2006–2013.

Study area—The main study area was a section of the South Platte River, between the towns of Orchard and Weldona, Colo-rado. This is an approximately 23.44-km section of river along Highway 144 starting just west of Orchard and ending 6 km east of Weldona. The main observation sites were four bridges over the river and an embankment directly next to the river, as well as a canal directly draining into the river from Jackson Lake. Other observations of the species were made at Brush State Wildlife Area (SWA), in Chartier Pond and a slough in the northeast part of the wildlife area.

Observations—Observations were conducted from 0800 to 1800, over 33 different days during the months of April to October, although we only made captures from May to Septem-ber. Overall we made 180+ observations of *A. s. spinifera* in the study area during the study. Behavioral and activity observations were generally made from the bridges or embankments over-looking the river, and closer documentation such as size, sex and appearance was based on captured individuals. Although *Apalone s. spinifera* is extremely wary and in most cases hard to observe (Webb, 1962), we found that the bridges provided an advantage because the turtles are comfortable with cars passing

over the bridge and do not scare off initially. The preferred method was to drive past the river to the end of the bridge and then walk the bridge by foot looking down onto the actual habitat to observe turtle behavior and track where the turtles go when frightened by our presence on the bridge.

Captures—All captures of turtles were by hand using two different methods. The first is “bird-dogging,” where one person is located on the bridge or high embankment and monitors the location of the target, directing the other person to the location. The other method might be called “Braille-ing,” a blind method that involves the use of bare hands or feet to feel through the substrate for buried turtles; the presence of a turtle may be unknown or based on the general location provided by the previous method.

Once captured, the sex of each turtle was determined based on size, carapace coloration or cloacal position (Dunson, 1967). Measurements were taken for every individual captured but only to the nearest quarter of an inch.

Results

Captures—During the study period a total of 39 turtles were captured (see Table 1). All captures were made in the river at the sites described. Of the 39 total turtles captured, 21 of them were caught during July and August, which months, according to Weatherbase (www.weatherbase.com, accessed 26 February 2014), have the highest average high temperatures for Wiggins, Colorado, the closest city to the study area.

Habitat—Main habitat was the South Platte River and its associated side channels and creeks. When the river is flowing well, 150 to 300 ft³/s according to USGS streamflow data, and has not had water from Jackson Lake drained into it, it is quite clear and the entire water column and substrate are visible, making observations easy. The river and related creeks have a gravel/sand substrate, with little to no aquatic vegetation, and rarely have floating pieces of wood or logs. At all of the bridges there are piles of large rocks or broken up slabs of concrete that are close to shore. Sandbars adjacent to the water were the only sites where basking was observed (see Figure 1) contradicting Lindeman (2001), though there are no other river-dwelling turtles present to push *A. s. spinifera* to other basking sites.

Even when flowing at low water depths the river has a swift

Table 1. Measurements of captured spiny softshells, *Apalone s. spinifera*, by sex.

Sex	Number captured	Mean carapace length (cm)
Females	30	34.1
Males	6	11.0
Unsexed juveniles	3	6.8



Figure 1. Female Eastern Spiny Softshell, *Apalone s. spinifera*, basking on a sandbar

current in the channels, and *A. s. spinifera* of both sexes are found in or around these currents (Plummer and Shirer, 1975). The river can be further divided into well documented micro-habitats in which different sexes and sizes of turtles are more likely to be found. The shallower, slower flowing waters, generally associated with the shoreline are where young turtles and males were most often observed, which is consistent with Moll (1976) and Plummer et al. (1997). The deeper currents or channels are typical habitat for the large adult females (Williams and Christiansen, 1981), although they can be occasionally observed foraging or basking in the shallow sections. *Apalone s. spinifera* were also observed in a canal coming from Jackson Lake and draining into the river. The canal also possesses a muddy/sandy substrate with little to no aquatic vegetation. The canal is generally filled with murky water unless running very low and undisturbed; the current depends on how much water is let out of the lake. The only observed basking spots in this canal were large slabs of concrete or some exposed mud banks. Other observations of *A. s. spinifera* in the area were conducted at Brush SWA, in a pond and slough. Both have deep, muddy substrates with moderately abundant to abundant aquatic vegetation and reasonably clear water. At this site, we observed basking by one large female on logs and by another female on a mud bank of the pond.

Activity, Habits and Evasion Tactics—Overnight activities were not observed, but overnight resting sites of turtles were clearly visible in the morning along sandbars. Daily activity can be observed on most warm days during the active months, but we noted that as temperature increased throughout the day, activity was more likely to be observed. Daily activity consists of basking for much of the morning (Ernst and Lovich, 2009). Basking has been observed as early as 0800 and goes until around 1430. Consistent with Plummer et al. (1997), the only softshells observed out of the water were basking, since we did not observe any nesting behavior. No individuals were seen dead or alive on the road, as has been seen with the other three species of turtle that inhabit that area of northern Colorado. Basking was observed to continue throughout the day but generally gives way to foraging as temperatures rise later in the day. Underwater activity, such as foraging, was strangely consistent

in its timing, especially in 2012, and normally didn't occur until 1400–1430 h. Exceptionally warm days could lead to earlier foraging times. Activity levels and numbers of softshells observed were higher on warmer days that approached 35 to 37.8°C. Some unique observations were made as the foraging turtles remained unaware of our presence. This species is very adept in the water with its streamlined body and flipper-like feet, but we have seen that while focused on foraging the turtles can become unaware of body orientation in the water current, which included turtles being flipped over in the current while remaining so focused on foraging.

Eastern Spiny Softshells are highly aware of their surrounding habitat and, in particular, when the habitat leaves them vulnerable. While basking they will face the water (Hammerson, 1999; Degenhardt et al., 1996), but we found they will exclusively bask next to portions of the river that have a deep channel or deep hole that they can escape into (see Figure 2).

We observed that *A.s.spinifera* will not bask on a site that is otherwise identical in appearance to known basking sites if the water next to it is too low/slow and clear, which would make them easy targets. When disturbed they enter the water and flee to the channel or hole in the river or to undercuts in the bank where there is sufficient cover. They are also very quick to leave usual habitats when water levels drop below their comfort zone (Cagle, 1942; Degenhardt et al., 1996). On 7 August 2011, a specific example of this was observed in a side channel of the river that had pooled up due to the creation of a beaver dam. When first observed the hole was around 1.2 m deep and murky, with an abundance of *Orconectes virilis* (Northern Crayfish), and soon four adult females were observed in this new habitat. A week after the four females were observed (12 August 2011) the water had dropped to approximately 0.9 m deep in the pool and had much clearer water giving the ability to see the bottom. Although there were a similar number of crawdads, not a single *A. s. spinifera* was observed at that location; however two *Chelydra serpentina serpentina* (Common Snapping Turtle), were observed in the hole in the following weeks.

Evasion tactics of the turtles in the river were easily observed and became quite predictable, with one exception. We observed that when turtles are disturbed or frightened while basking they



Figure 2. Turtle shown basking faces deeper water, despite main river channel behind it.

dive into the water and do not dig into the substrate. Instead they either swim quickly downstream in a swift flowing channel or, when the threat is not immediate, they will stay in the water close to the basking site and will pop their heads above water to try and return to the basking site. The only exception to these often-observed evasion behaviors was a female on 18 May 2010 that was basking at 0900 on a cool morning, and when we frightened her she simply dug in below her basking site. This marked the only capture, of the 39 total, we made of a turtle that was initially observed to be basking out of the water. In contrast to the evasion tactics used when basking, threatened turtles in water did not flee and head for the channel but instead used the digging-in method that has been well documented (Graham and Graham, 1991). There was also one observation of a turtle digging into the side of a bank, seen as we were conducting a search for turtles while walking in the river, which lends support to the notion that digging in is their preferred method when threatened in the water. When they dig in they can stay in the substrate for up to 20 min (Stone et al., 1992). One of the very few instances in which a turtle did not perform this behavior, the individual did a mock dig-in, which kicked up a cloud of sand and gravel and then proceeded to swim downstream through the cloud it had created. These evasion tactics were consistent throughout both sexes and all sizes of the turtles that we observed in the river. The only difference was that the large females were in the deep channels more often, where water visibility was greatly reduced.

While actual overwintering was not studied, some pre-overwintering activity was observed. Starting in 2009 and continuing through 2012 we observed that *A. s. spinifera* will congregate at the deepest hole along this particular stretch of river, which we observed at two different sites. The first was in 2009, when a large hole, that eventually reached over 3 m in depth, was created in a bend of the river at the observation site without a bridge. When this hole was created, turtles congregated in fairly large numbers—at least eight were observed at one particular time. Also on 24 September 2011, five turtles were caught within an area of approximately 3 m² in the hole previously described. These observations support the notion that this species performs communal overwintering/burial (Graham and Graham, 1997; Galois et al., 2002). In 2012 this first deep hole became filled in with river sediment and the turtles congregated at a new site where the Jackson Lake canal connected with the river, where at least six turtles were observed. This 2012 congregation seemed to be correlated with an upstream movement observed during the last two months of activity, which is consistent with behaviors reported in other populations (Graham and Graham, 1997; Galois et al., 2002). This behavior started in early September, when no turtles were observed at the downstream bridges, which had seen turtle activity at the beginning of the year, but large numbers were now at this large hole. On 5 August 2012, two large females were observed walking upstream along the bottom of the river, not foraging, with one individual following directly behind the other (Figure 3). We had never before observed females behaving this way as a group. This strange observation may be showing the strong urge to congregate at a suitable overwintering site.

It should be noted that in both 2011 and 2012 the river was

running low at the end of the activity period and these holes could have been the only viable options for hibernation, thus leading to communal overwintering as a necessity and not just as an option.

Discussion

Habitat—*Apalone s. spinifera*, as mentioned by Hammerson (1999) is relatively abundant within the South Platte River, as is the case with the stretch of river that was studied. As Moll and Moll (2004) reported, *A. s. spinifera* is the dominant species of this river system, with very few observations of *Chelydra s. serpentina* in the actual river and only one *Chrysemys picta belli* (Western Painted Turtle) sighting and capture in the river itself during the study period. Outside the immediate area of the river, *C. s. serpentina* and *C. p. belli* become much more numerous than *A. s. spinifera*, as observed in Brush SWA. The river habitat composed of a sandy bottom and swift current is very typical of other reported habitat for this species. The populations we studied in Colorado show the same use of microhabitats that has been observed in other populations (Moll, 1976; Plummer et al., 1997).

Activity, Habits, and Evasion Tactics—While it has been reported that *A. s. spinifera* may be active during nighttime hours (Wade and Gifford, 1965), we did not conduct any observations at night; this would be a natural complement to our current study since Colorado nighttime temperatures may be cooler than other states and render nocturnal activity to a minimum. Basking habits have been reported in numerous other studies (Lindeman, 2001, Ernst and Lovich, 2009) and our observations of body orientation and basking site choice correspond to what is commonly found in the species with the exception that *A. s. spinifera* in the study area only used sandbars in the river system to bask on, which contrasts with the report of Lindeman (2001). This could be because there is a lack of another dominant riverine species, and perhaps a study in other regions such as Kansas needs to be done to see if *A. s. spinifera* still use only sandbars to bask in the presence of another riverine species such as *Apalone mutica mutica* (Midland Smooth Softshell). Activity of all kinds was observed to increase on warmer days, which correlates to *A. spinifera*'s preferred active temp of 32.7°C (Hutchison et al., 1966), which is higher than that of other turtle species co-occurring in the study area, *C. s. serpentina* 24.5–28°C (Steyermark, et al, 2008) and *C. p. belli*



Figure 3. Two females, one following behind the other.

20.7-22.4°C (Ernst, 1972). The increased activity and foraging in the afternoon also correlates strongly with observations made by Smith and Iverson (2004), although the consistent timing of the activity we found has not been previously reported. The awareness of its surrounding habitat seems to be a common theme across all populations of *A. s. spinifera*. Evasion tactics have not been studied very well across the species' range and more studies could be done to see if it is a consistent theme such as the one we found here in this population. A variable that may determine different behaviors could be the size of the body of water, since the South Platte River is much smaller than other rivers in this species' range. Additionally, the types of predators that inhabit the area are different throughout the range and therefore could influence the way the turtles respond to a threat. These types of observations could be extended beyond our focal taxon to include other riverine species such as *A. mutica*, *Pseudemys concinna* (River Cooter), and species of *Graptemys* (Map turtles). Findings such as this can potentially provide valuable natural history information and may aid in the conservation of species if we are able to understand how they utilize habitats and avoid different threats. An area that needs further understanding is overwintering in this population since our reports of congregations and communal burying at large holes seem to contrast what other reports have said (Plummer and

Burnley, 1997). Although as noted before these holes may have been one of just a few viable hibernation locations. Lastly, our study was primarily onsite observations and we have little understanding of the extent of this area/river individual turtles utilize, therefore a study on the home range of this species in Colorado relative to other populations would be valuable. Other studies that could be done on this population include a more in depth study of size of these turtles to compare to other locales. While we did observe some feeding behavior on crawdads and carrion of different kinds, a thorough diet study could be done to give a clearer picture of what this species eats in this area. Also studies of nesting could be conducted to determine what a highly variable climate that is found in Colorado would do to nesting habits as well as incubation and hatching patterns.

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Literature Cited

- Cagle, F. R. 1942. Turtle populations in southern Illinois. *Copeia* 1942(3):155-162.
- Degenhardt, W. G., C. W. Painter and A. H. Price. 1996. *Amphibians and reptiles of New Mexico*. Albuquerque: University of New Mexico Press.
- Dunson, W. A. 1967. Relationship between length and weight in the spiny softshell turtle. *Copeia* 1967(2):483-484.
- Ernst, C. H. 1972. Temperature-activity relationship in the painted turtle, *Chrysemys picta*. *Copeia* 1972(2):217-222.
- Ernst, C. H., and J. E. Lovich. 2009. *Turtles of the United States and Canada*. Baltimore: The Johns Hopkins University Press.
- Galois, P., M. Léveillé, L. Bouthillier, C. Daigle and S. Parren. 2002. Movement patterns, activity, and home range of the eastern spiny softshell turtle (*Apalone spinifera*) in northern Lake Champlain, Québec, Vermont. *Journal of Herpetology* 36(3):402-411.
- Graham, T. E., and A. A. Graham. 1991. *Trionyx spiniferus spiniferus* (eastern spiny softshell): Burying behavior. *Herpetological Review* 22(2):56-57.
- Graham, T. E., and A. A. Graham. 1997. Ecology of the eastern spiny softshell, *Apalone spinifera spinifera*, in the Lamoille River, Vermont. *Chelonian Conservation and Biology* 2(3):363-369.
- Hammerson, G. A. 1999. *Amphibians and reptiles in Colorado*. Boulder: University Press of Colorado.
- Hutchison, V. H., A. Vinegar and R. J. Kosh. 1966. Critical thermal maxima in turtles. *Herpetologica* 22(1):32-41.
- Lindeman, P. V. 2001. A contrast in the basking habits of the sympatric trionychid turtles *Apalone mutica* and *A. spinifera*. *Herpetological Natural History* 8(1):87-89.
- McGaugh, S. E., C. M. Eckerman and F. J. Janzen. 2008. Molecular phylogeography of *Apalone spinifera* (Reptilia, Trionychidae). *Zoologica Scripta* 37(3):289-304.
- Moll, D. 1976. Environmental influence on growth rate in the Ouachita map turtle, *Graptemys pseudogeographica ouachitensis*. *Herpetologica* 32(4):439-443.
- Moll, D., and E. O. Moll. 2004. *The ecology, exploitation, and conservation of river turtles*. New York: Oxford University Press.
- Newman, H. H. 1906. The habits of certain tortoises. *Journal of Comparative Neurology and Psychology* 16(2):126-152.
- Plummer, M. V., and J. C. Burnley. 1997. Behavior, hibernacula, and thermal relations of softshell turtles (*Trionyx spiniferus*) overwintering in a small stream. *Chelonian Conservation and Biology* 2(4):489-493.

- Plummer, M. V., T. L. Crabill, N. E. Mills and S. L. Allen. 2005. Body temperatures of free-ranging softshell turtles (*Apalone spinifera*) in a small stream. *Herpetological Review* 36(4):371-375.
- Plummer, M. V., N. E. Mills and S. L. Allen. 1997. Activity, habitat, and movement patterns of softshell turtles (*Trionyx spiniferus*) in a small stream. *Chelonian Conservation and Biology* 2(4):514-520.
- Plummer, M. V., and H. W. Shirer. 1975. Movement patterns in a river population of the softshell turtle, *Trionyx muticus*. *Occasional Papers of the Museum of Natural History, The University of Kansas* 43:1-26.
- Steyermark, A. C., M. S. Finkler and R. J. Brooks (editors). 2008. *Biology of the snapping turtle (Chelydra serpentina)*. Baltimore: The Johns Hopkins University Press.
- Stone, P. A., J. L. Dobie and R. P. Henry. 1992. The effect of aquatic O₂ levels on diving and ventilatory behavior in soft-shelled (*Trionyx spiniferus*), stinkpot (*Sternotherus odoratus*), and mud turtles (*Kinosternon subrubrum*). *Physiological Zoology* 65(2):331-345.
- Wade, S. E., and C. E. Gifford. 1965. A preliminary study of the turtle population of a northern Indiana lake. *Proceedings of the Indiana Academy of Science* 74:371-374.
- Webb, R. G. 1962. North American recent soft-shelled turtles (family Trionychidae). *University of Kansas Publications, Museum of Natural History* 13(10):429-611.
- Williams, T. A., and J. L. Christiansen. 1981. The niches of two sympatric softshell turtles, *Trionyx muticus* and *Trionyx spiniferus*, in Iowa. *Journal of Herpetology* 15(3):303-308.

The DIME before the Dollar, an Introduction to Rattlesnake Alley

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Somewhere buried in Maricopa County, Arizona, is a landscape devoid of any worthy purpose save for its propensity to produce rattlesnakes in large numbers. The place is a scenic flop. Despite the ridiculous numbers of rattlesnakes found there, truth be told, it is an eyesore. The terrain is flat and featureless, dominated by creosote, broken beer bottles and all other manners of desecration that humans can heap upon it. Even the most ardent lover of nature might take a look at the place, and decide it would be a good resting place for their yard trimmings, or old washing machine, mattress and refrigerator. The place is little more than a giant vacant lot, only uglier. But the snakes there don't seem to mind all this, and against all odds, seem to be flourishing there.

When immersed in the turkey shoot conditions of herping there, we constantly ask the same question of each other. It always starts with how, or why. "How can there be so many snakes here?" "Why are there so many snakes here?" Thus far, all of our visits here have been nocturnal. As we seek an explanation for the huge biomass of snakes in the area, we do not overlook the explosive rodent population furtively darting about at our feet. With every trip out, we also clobber our usual annual Banded Gecko (*Coleonyx variegatus*) count. That's right—we find more surface-active geckos in one night here than the rest of the places we visit for the remainder of the year combined! There are two other factors that might contribute to a burgeoning snake population. The first is a dry wash that cuts deeply through the heart of it all. The embankments to either side are steep, and infested with deep running soil holes and gashes. These embankments in turn are crowded with a snarl of plant life, dominated by paloverde trees and hackberry. We often have to cross the wash to view a find made on the opposite side of it. A 15-meter straight walk often becomes a 100-meter game of vegetative dodge ball. At times, one can't get there from here. So infested with rattlesnakes is this dry gulch that it has earned the name "Rattlesnake Alley."

In examining the area for the how and why of the snake population, we take into consideration a plethora of rodents, and lots of geckos. And we have Rattlesnake Alley, with its abundant hidey holes and dense vegetative cover. There is a final factor that may influence the mix. On the east side of it all, there is a semi-urban development. And with civilization comes water—likely the final ingredient to the biological success of the area. We have also toyed with the notion that this area is possibly a release site used by the local Fire Department for nuisance rattlesnake relocation. But the behavior on the part of the snakes under watch does not support this idea. What we are seeing are many well-fed snakes coiled in classic ambush postures, and not a bunch of confused and scrawny snakes crawling aimlessly about. To date, I have been there three times, and have not yet observed a single rattlesnake on the crawl. They are all coiled and set up in the fashion of rattlesnakes that are familiar with their turf. Perhaps further visits to the place will provide other

clues as to the how and why of the explosive numbers of rattlesnakes residing in the area.

Before launching into the type of numbers that we see in and around Rattlesnake Alley, this author should discuss what he considers to be a good snake day in other locales. There are many ways to find snakes, but this author only uses three methods. They are, in the order of the importance that I place on them, hiking them out, road cruising, and flipping downed objects. The benefits of hiking snakes out are many. In a nutshell, I live to be outdoors, and there are many cool behaviors that can be witnessed that seldom present themselves when road cruising or flipping trash. Road cruising is boring, and these days I usually only do that on my way to, or back from, a favored hiking destination. I am much more inclined to road cruise for pleasure by day than by night, as the splendor of the Arizona setting is more enjoyable when one can see it. And the diurnal road cruises also help me to view Coachwhips and Patch-nosed Snakes, not to mention many species of lizards in prodigious numbers. I consider flipping objects the lowest form of herping, and limit myself to doing it only in the peak season. Around Tucson, that is the months of February through early April.

When road cruising nocturnally, if one finds ten snakes over a five-hour period, live or dead, that is a good night. With daylight cruising, three snakes is a good day. On a good day of flipping, if one finds 15 snakes over a five-hour period, that is good. If four people enter an area on foot, and herp it for five hours, I consider six snakes to be a good day or night. When we do Rattlesnake Alley, we are night hiking. Again, in a normal area on a good night, four people might come up with six snakes in a five-hour period. But Rattlesnake Alley is not a normal area.

News of Rattlesnake Alley first came my way via an email from Dale DeNardo. The email was dated 1 September 2015. This is what Dale wrote: "We went out to (nearby town's name withheld) last night to collect some monsoon blood samples from *atrox*. We spent 2.5 hours herping along a single wash a couple herpers who showed us the place refer to as Rattlesnake Alley. It earned its name!! The night started out with a bang as within five minutes we simultaneously had 3 snakes in tongs being tubed. And it never really slowed down, whether dry or pouring rain." Dale went on to elaborate that the total snakes found that night was 40! In all, Dale's email was a half-page full of rip-snorthing, unabashed enthusiasm. Dale is normally quite reserved, and anything more than two sentences in an email from him is rare. A few nights later, Dale went back with a gang of five others, and scored 59 snakes! His email that recounted the blow-by-blow events ended with "a snake every 3 minutes should solidify your interest in coming up next Friday night!" A snake every 3 minutes did indeed solidify our interest, and that next Friday night found Marty Feldner and me joining the party. Even though my first adventure in Rattlesnake Alley far exceeded my expectations, I'm not going to describe that evening here. We have bigger fish to fry!

On the evening of 19 August 2016, John Slone, Marty Feldner and I gathered in Slone's mighty Ford F150 and jetted northward. We were *supposed* to arrive at the Rattlesnake Alley parking spot at 1930 hours. But John and Marty have jobs that do not allow early egress for herping trips. (Slave drivers!). As the emails from our end predicted, we did not arrive until 1950—20 minutes late. By then, the other six members of the party were waiting on us. The six who patiently endured the epic flandickery of preparation that followed were Dale DeNardo, Megan Murphy, Sarah and Craig Hurd-Rindy, Mike Comroe and Brian Lang. While Slone and Feldner fumbled with putting on their boots and gaiters, I got my herp journal prepared for the evening. My trusty Kestrel weather station indicated that the air temp was 31.5 C, with 80% cloud cover, 42% humidity, with a pleasant and constant breeze of 6–8 miles per hour. Light to moderate rain fell sporadically during the hike. Weather conditions at 2300, when the adventure was behind us, were 29.5 C, 80% clouds, 41% humidity, with wind speeds of 0–6 mph.

We began moving at 2010 hours, and did not find the first snake for over half an hour. This gave me ample time to gleefully cuss DeNardo for forcing us to arrive too early for no purpose. So busy was I with wasting my oxygen on bitching instead of hiking that I soon started lagging behind. Megan, John and Marty had taken the lead, and began to score snake after snake. In the early goings of the hike, I was the last to arrive at each snake. It did not seem to matter which side of Rattlesnake Alley I was on, as the find would occur on the opposite side. This in turn forced me to arrive at each snake by taking the most circuitous route possible, and my forearms grew bloody from brush crashing.

I finally decided to stay the course by walking up the middle of the wash. That way, I would only have to crash through half as much foliage in order to view the find of somebody else. The decision to keep in the middle paid off quickly. I was walking side by side with my fellow tail-gunner Dale, with but a narrow strip of paloverde trees separating us. Dale cried out “*Atrox!*” And then, with the same breath, he called out “Whoa! He just bit a mouse!” I instinctively looked at my watch, knowing that the timing of what might follow could be important. It was 2107 hours. I crashed through an overhanging umbrella of paloverde in time to see the mouse skitter to a halt. As I passed by Dale's *atrox*, it was busily setting its jowls in the usual post-strike fashion. I instantly decided to wait this out, and hopefully, get some good images of a feeding event. Whatever was ahead couldn't possibly be better than this. Dale was also game to wait with me. Gradually, Sarah, Craig, Mike and Brian drifted over to join us, and they too opted to wait with us. Megan, Marty and John were now well out of earshot, whilst merrily racking up huge numbers of snakes in the process.

I am convinced that the “mouse” was dead within minutes after it stopped its nine-meter dash from the *atrox* that nailed it. (Dale paced the distance off at the end of it all. Said distance was nine of his paces. Hence, we are calling the distance nine meters, although any resemblance between one of Dale's strides and one meter would be purely coincidental). Now that the length of that mouse's last erratic sprint has unequivocally been established, it is time to discuss the mouse itself. Any rattlesnake

aficionado worth their salt would be able to identify the exact species of the prey item on the spot. But I had to resort to looking it up later. I dug out my 1964 edition of Peterson's *A Field Guide to Mammals*, authored by Burt and Grossenheider. If things haven't changed over the past 52 years (and why would they?), our mouse was a Merriam's Kangaroo Rat (*Dipodomys merriami*). We will resort to the method of the local biologists by combining the first two letters of the genus with the first two letters of the species with all references to the verminous fur ball that follow.

Hence, the DIME was approximately 85 mm long from snout to tip of tail, with an estimated mass of less than 20 grams. Its erratic nine-meter sprint carried it across a two-meter-wide swath of open wash soil, through a few rays of a prickly pear cactus, and it stopped and quickly died under the open west canopy of a large (~4 m tall by 3 m wide) paloverde tree. Thus endeth the DIME, and the dollar (AKA the *Crotalus atrox*, or CRAT) is about to enter the narrative again. The CRAT was a male, approximately 90 cm long SVL, with a rattle count of basal plus 5, with segments 6 and 7 broken. His estimated mass would be in the neighborhood of 400 grams, making him an average sized adult male. The DIME, if consumed, would be little more than a mouthful for him.

It would have been nice to be able to photograph the CRAT as he broke coil and began to slowly and methodically follow the exact path that that the DIME had followed post-envenomation. But as Dale was the one who witnessed the death blow, he took it upon himself to become the big Sheriff of the observation. If I were even so much as sweep the area with my flashlight, I was barked back into place by his royal highness, the Big Sheriff of Rattlesnake Alley. This grew aggravating, and at one point, I snapped at him, and reminded him that “I'm *not* one of your darn students.” This brought a chuckle from the remainder of the group, as several of them *were* his students, who knew only too well the demon that I was dealing with. At precisely 2132, the CRAT reached the DIME (25 minutes post-bite), and I was finally allowed to move in for the photography. My first several shots were going badly. Mike was standing directly behind me, watching my LCD screen, and began to advise me to adjust my camera to a macro setting for the images. As Mike seemed to know what he was talking about, and I was perform-



Figure 1. Overview of *Crotalus atrox* devouring *Dipodomys merriami*, 19 August 2016. See text for details. Photography for Figures 1–3 by Mike Comroe.



Figure 2. Barely a mouthful . . .

ing my duties poorly, I handed my camera to him and turned him loose. As Figures 1 through 3 clearly demonstrate, this was a wise decision. Beautiful! I didn't know my camera could do such good work! The last tip of the tail disappeared down the gullet of the CRAT at 2152. The total time span elapsed from bite to post-prandial yawn was 45 minutes.

Off we went into the night, finding new snakes, or re-finding the snakes that Megan, Marty and John had already found. When Dale blundered upon and announced a Mojave Rattlesnake (*Crotalus scutulatus*), Marty's voice appeared from somewhere in the inky black darkness ahead to inform us that he had already found this snake. At the end of this stellar evening, we

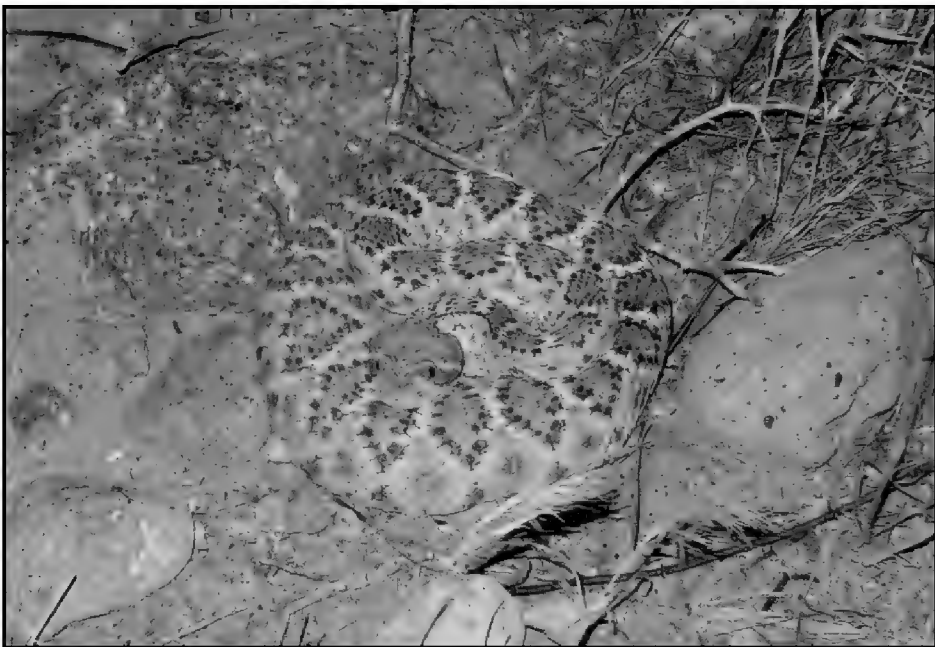


Figure 4. This image of a pregnant female *Crotalus atrox*, coupled with zero neonatal observations during the evening under discussion, set up the next visit to Rattlesnake Alley. Image by author.



Figure 3. "U-m-m-m-m, yummy! And here comes the best part—the cloacal swab."

all compared notes to find that as a group, we had observed 37 Western Diamond-backed Rattlesnakes (*Crotalus atrox*), 4 Mojave Rattlesnakes (*Crotalus scutulatus*), 3 Gophersnakes (*Pituophis catenifer*), and 1 Long-nosed Snake (*Rhinocheilus lecontei*). We also found 2 Common Side-blotched Lizards (*Uta stansburiana*), 1 Zebra-tailed Lizard (*Callisaurus draconoides*), and 22 Western Banded Geckos (*Coleonyx variegatus*). My own pathetic contribution to the evening was one of the CRATs, and 4 of the geckos, which brought about some jeers and horse laughs from the super-herper crowd. I shrugged, and abruptly informed them that they did not have on their cameras what I had on mine.

My last image of the night (Figure 4), was of a female CRAT coiled in ambush posture. I took several images of this snake, thinking that I was photographing a snake with a hefty food bolus. Upon studying the images thoroughly in the days that followed, it was ascertained that said "food bolus" extended from the front third of the snake right on down to her nether regions. This was not a snake with a food bolus, but rather, a pregnant female. Prior to this revelation, I had written in my notes for the evening, "all snakes found were adults—zero neonates." The emails began to fly, and the preparations for our next trip to Rattlesnake Alley began to materialize. Nearly 15 years of radio-tracking CRAT have taught me that August is their birthing month. And if the females at Rattlesnake Alley had not yet dropped, they would soon. The fantastic trip that followed might be discussed someday, but for now:

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Herpetology 2016

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

CORNSNAKE PREY-HANDLING BEHAVIOR

D. A. Penning and S. Cairns [2016, Journal of Herpetology 50(2):196-202] studied the effects of relative prey mass and experience on prey-handling behaviors of 16 ingestively naïve corn snakes (*Pantherophis guttatus*) feeding on different categorical sizes of live house mice (*Mus musculus*) over 11 feeding trials. The authors randomly assigned hatchlings to two categories of prey mass, relative to snake mass (small = 20–40% and large = 41–60%), and analyzed the effects of prey mass on capture position, prey-handling method, time to subdue prey, condition of prey at ingestion, direction of ingestion, and duration of ingestion. Prey mass significantly affected prey-handling behaviors. As snakes experienced larger prey, they used more complex prey-handling behaviors (hairpin loops and constriction). Snakes that had prior large-prey experience maintained constant subduing times across feeding trials, whereas snakes that had prior experience with small prey showed an increase in subduing time across trials. Snakes feeding on large prey took longer to ingest prey than snakes feeding on small prey; however, as snakes gained feeding experience, they maintained relatively constant ingestion times across trials. All snakes employed complex prey-handling behaviors prior to the point at which the prey could vigorously defend themselves, suggesting an advantage to employing complex behaviors before they are necessary. When prey reached a certain absolute size, all were constricted and killed, regardless of prior experience or relative prey size.

SOUND PRODUCTION BY AMPHIUMAS

J. A. Crovo et al. [2016, Herpetologica 72(3):167-173] note that in contrast to anurans, acoustic communication and hearing within Order Urodela is poorly understood. Several studies have documented sound production in a few salamander species; however, these studies did not examine auditory ranges of these salamanders simultaneously. Two-toed amphiumas (*Amphiuma means*) were used as a model to examine the ecological significance of sound production in salamanders. A series of behavioral trials were conducted to validate sound production in this species, and auditory-evoked potentials were measured to assess hearing abilities. *Amphiuma means* produced three unique broadband acoustic signals: low-, mid-, and high-frequency clicks. All acoustic signals were produced when *A. means* were placed in groups, but not when housed individually. The audiogram was relatively flat at 100–700 Hz; above this range, sensitivity declined with increasing frequency. No auditory responses were detected between 1.5 and 10 kHz. The dominant frequencies of the acoustic signals (2.7–11.7 kHz) were higher than the audiogram bandwidth, although the lower bound of lower-frequency clicks could effectively stimulate the auditory system for communication at short distances. This study suggests that *A. means* utilizes acoustic signals during social interactions.

ECOLOGY OF ARBOREAL PLETHODONTIDS

K. D. McEntire [2016, Copeia 104(1):124-131] notes that salamanders in the family Plethodontidae are widely distributed and the most diverse lineage of caudates. Plethodontids occupy forest and freshwater habitats, where they can achieve remarkable abundance and biomass. The majority of tropical plethodontids are arboreal. Though generally considered ground dwelling, a large proportion of temperate species have been observed climbing shrubs, trees, and herbaceous vegetation. Approximately 45% of terrestrial and semi-aquatic (not including permanently aquatic) plethodontid species are known to obligately or facultatively climb vegetation; yet, with the exception of tropical plethodontids, the importance of arboreal habits is generally underappreciated. The potential benefits of arboreality vary based on life history and geography but may include improved olfaction, increased foraging potential, shelter and nesting, and predator avoidance. Constraints on arboreality include increased water loss rates and morphological limitations. Recognition of arboreal habits as a relevant component of salamander ecology is important in rapidly changing landscapes with anthropogenic alterations to midstory and canopy communities.

EFFECTS OF “CONSERVATION GRAZING”

C. J. Reading and G. M. Jofré [2016, The Herpetological Journal 26(2):131-138] note that cattle grazing is being used increasingly by landowners and statutory conservation bodies to manage heathlands in parts of mainland Europe and in the UK, where it is called “conservation grazing.” Between 2010 and 2013, cattle were excluded from six hectares of lowland heath, in southern England, that had been subject to annual summer cattle grazing between May 1997 and autumn 2009. Changes in grass snake *Natrix natrix*, common lizard *Zootoca vivipara*, slow worm *Anguis fragilis* and sand lizard *Lacerta agilis* numbers were recorded annually in the ungrazed area and in a four hectare area of heathland adjacent to it that continued to be grazed. The number of grass snake, common lizard and slow worm sightings were significantly higher in the ungrazed heath than the grazed heath and were associated with increased habitat structure, resulting principally from increased height and cover of grasses, particularly *Molinia caerulea*. Conversely, there was no significant difference in the number of adult sand lizard sightings between the grazed and ungrazed heath though sighting frequency was inversely correlated with both grass and grass litter cover. These results suggest that the use of cattle grazing as a management tool on lowland heath is detrimental to grass snake, slow worm and common lizard populations but may be less so to adult sand lizards. Although newborn slow worms and common lizards were observed throughout the study area, significantly fewer were found in the grazed areas than the ungrazed areas. The absence of newborn grass snakes and sand lizards in the grazed areas suggests that successful breeding had not occurred in these areas.

Advertisements

For sale: **highest quality frozen rodents.** I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , \$25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), \$27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , \$30/100; Large fuzzy mice /hoppers (10 to 12 days old—8 to 10 gm), \$35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale: 25 large, heavy-duty, open-top white plastic tubs, most with installed drains, perfect for aquatic/semi-aquatic turtles, small lizards, etc. Segments of PVC drain pipe fitted to tubs can be included with purchase. Each tub is approximately 36 inches by 66 inches, and approximately 12 inches in depth. All are gently used and in great shape. Asking \$75 each, \$65 each for 2 or more. Pick-up only from Kenosha, Wisconsin, area. Contact Jim or Kirsten at (262) 331-3423.

For sale: Standard 24" Neodesha reptile cages, 3 × 6" vent on top, tempered glass front. Like new condition, no burns or stains, original glass. These cages do not have the dam (horizontal molding that crosses the entire front width of the cage, used to hold back bedding material)—easier to clean without the dam. About 20 currently available, \$45 each. Linda Malawy, (630) 717-9955, linda_malawy@hotmail.com.

Herp tours: **Costa Rica herping adventures.** Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

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Minutes of the CHS Board Meeting, July 15, 2016

John Bellah called the meeting to order at 7:40 P.M. Board members John Archer, Aaron LaForge and Amy Sullivan were absent. Minutes of the June 17 board meeting were read and corrected.

Midwest Symposium: Most speakers have been lined up. Still need a banquet speaker and other. John Bellah will e-mail announcements to local university biology departments.

Social media: Morgan Lantz attended the meeting. She discussed her interest in managing social media for the CHS. She has experience with this from previous herp related activities. She suggested using the MeetUp website to find new people and connect them to the society. John Bellah will investigate. Brandon wants more pictures for Instagram. He has been posting mostly their set-up at shows.

CHS website: The board discussed revamping the website. John B. will make a list of what needs to be modified.

Officers' Reports

Treasurer: No report this month.

Vice-president: Jessica Wadleigh reported that Marty Crump

will speak at the November 30 meeting about reptile and amphibian folklore.

Corresponding secretary: Amy Bochenko will send a thank-you letter to Allison Pelletier of Curious Creatures for presenting at the July Jr. Herpers meeting.

Membership secretary: Mike Dloogatch read the list of memberships that expired in May.

Sergeant-at-arms: Brandon Ottolino reported attendance of 31 at the general meeting in June.

Committees

Shows: Reviewed the list of upcoming shows June–September. Dick Buchholz will be covering most.

Jr. Herpers: Attendance was 22 at the July show & tell meeting. In August Collin Langendorfer of Crosstown Exotics will talk about big snakes and lizards.

The meeting adjourned at 9:10 P.M.

Respectfully submitted by recording secretary Teresa Savino

News and Announcements

FUNDING FOR PRAIRIE RESEARCH

Prairie Biotic Research (PBR) is an all-volunteer, Wisconsin nonprofit established in 2000 to foster basic biotic research in prairies and savannas. One way we do this is through a competitive Small Grants Program that funds grants up to \$1000 to *individuals* for the study of any grassland taxon anywhere in the USA. We support both natural history and experimental science. We are especially eager to support independent researchers (those lacking institutional support), but anyone having a U.S. Social Security number may apply. *Since 2002, we've awarded 242 grants worth \$232,076 to people in 36 states* to study insects, plants, mammals, reptiles, slime molds, mycorrhizal fungi, spiders, snails, amphibians, birds, fish, invasive species, effects of management, and the human dimensions of conservation. Many of these grants supported graduate student research. We believe in the importance of collecting voucher specimens that will be carefully curated as information-rich specimens and donated to a public institution; we are not categorically against collecting specimens, as some citizen science groups are. In 2017, we expect to fund at least 18 grants of up to \$1000 each with the donations we have received, including some restricted by donors to support research in Iowa or Wisconsin.

To apply for a grant: Visit our website (prairiebioticresearch.org) to learn more, to find our proposal form, instructions, and a sample researcher agreement form that winners of this competition must sign. Check out the history and overview files in the Small Grants section of the website to see what sorts of proposals have won funding in the past. Several winning proposals from past years are available as models on our website. Review the reports submitted by researchers of past years. Those who won funding in 2016 are ineligible for this funding in 2017, but those who won funding longer ago are welcome to submit proposals to further that same work or to support a new project. Please submit your proposal electronically, as a pdf file attached to an email. *We must receive your proposal via email by December 20, 2016.*

Become a supporter: Please make a donation to support our work; you can now do so using Visa or Mastercard through PayPal on our website. We cannot give away money that we don't have. Any amount is welcome. PBR is volunteer-run so our overhead is very low. You may specify that your entire tax-deductible donation be given to researchers through our Small Grants Program, or to expand our research endowment that produces income we give away annually through this program. Please help us to help others!

Michael Anderson, Craig Brabant, Rebecca Christoffel, Linda Duever, Jaime Edwards,
Brick Fevold, Joshua Kapfer, Kerry Katovich, Douglas LeDoux, Victoria Nuzzo, Ron Priest,
Dennis Schlicht, Steven Sullivan, Scott Swengel, Andrew Williams, Daniel Young,
who comprise the Board of Directors and Scientific Advisors of Prairie Biotic Research, Inc.

News and Announcements (cont'd)

PROPOSED AMENDMENT TO THE CHS BY-LAWS

The by-laws of the Chicago Herpetological Society are posted on the CHS website (www.chicagoherp.org). The procedure for amendment is spelled out in Article XII as follows: Amendments to these by-laws may be proposed by the Board of Directors or by submission to any officer of a proposal signed by any ten members. Any such proposed amendments shall be mailed to all members at least five days prior to the next membership meeting. Amendments must be accepted by a two-thirds majority of the members voting thereon at said meeting. Amendments shall then become effective upon publication.

The proposed amendment below was accepted by a unanimous vote of the board members present at the September 16, 2016, board meeting. It will be voted upon by the members present at the October 26, 2016, general meeting. If the vote is in favor, the amended by-laws will be posted on the CHS website and will become effective at that time.

Article V:

From:

The officers of the Society shall be President, Vice-president, Treasurer, Recording Secretary, Membership Secretary, Publications Secretary, Corresponding Secretary, and Sergeant-at-arms. The term of office shall be one year commencing on January 1 following election.

To:

The officers of the Society shall be President, Vice-president, Treasurer, Recording Secretary, Membership Secretary, Media Secretary, and Sergeant-at-arms. The term of office shall be one year commencing on January 1 following election.

Article VI

From:

Section 4. The **Recording Secretary** shall record the minutes of all membership and Board of Directors meetings, and shall retain the Society minutes and records.

To:

Section 4. The **Recording Secretary** shall record the minutes of all membership and Board of Directors meetings, conduct all correspondence and mailings in a timely fashion, and shall retain the Society minutes and records.

From:

Section 6. The **Publications Secretary** shall be responsible for all publications as directed by the President or the Board of Directors. He may act as Editor for any or all publications, or he may appoint editors, subject to the approval of the Board of Directors in either case. Additional staff members may be appointed by the editor(s) as necessary.

To:

Section 6. The **Media Secretary** shall be responsible for the dissemination of all society information and publicity by electronic means as directed by the President or the Board of Directors.

Section 7 will be eliminated. Section 8 will be renumbered Section 7.

Article VII

From:

Section 1. The Board of Directors shall consist of the President, Vice-president, Treasurer, Recording Secretary, Membership Secretary, Publications Secretary, Corresponding Secretary, Sergeant-at-arms, immediate past President and three members at large, except as provided by Article IX, Section 4.

To:

Section 1. The Board of Directors shall consist of the President, Vice-president, Treasurer, Recording Secretary, Membership Secretary, Media Secretary, Sergeant-at-arms, immediate past President and three members at large, except as provided by Article IX, Section 4.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, September 28, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. Speaking at this meeting will be **John Vanek**, a new Ph.D. student in Richard King's lab at Northern Illinois University in Dekalb. John's topic will be the ecology of the eastern hog-nosed snake, *Heterodon platirhinos*. This talk is based on research for which John received a CHS grant in 2014.

No speaker has yet been confirmed for the October 26 meeting.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

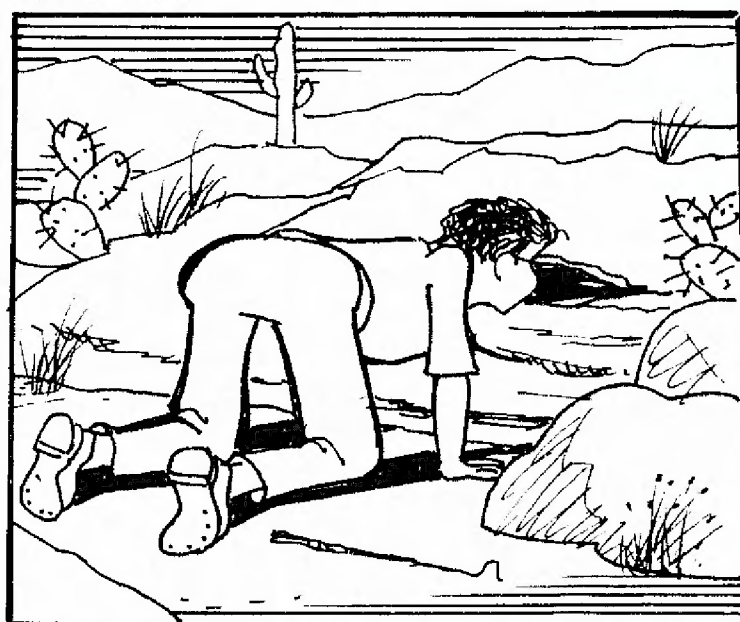
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, October 14, 2016, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

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